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ABSTRACT OF THE DISCLOSURE

5 A planarization process for filling spaces  
between patterned metal features formed over a  
surface of a semiconductor substrate. The  
patterned metal features are preferably coated  
with a dielectric barrier. The dielectric  
10 barrier is coated with an material that expands  
during oxidation or nitridization to a thickness  
about half the depth of the space between  
metallized features. The layer is then plasma  
oxidized using an RF or ECR plasma at low  
15 temperature with an oxygen ambient.  
Alternatively, the layer is plasma nitridized at  
low temperature. The plasma oxidation or  
nitridization is continued until the expandable  
material is converted to a dielectric and has  
20 expanded to fill the space between patterned  
metal features. Optionally, the process can be  
followed by a mechanical or chemical mechanical  
planarization step.

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